

KNOWLEDGE OF DIABETES
AMONG ELEMENTARY SCHOOL TEACHERS

A Thesis

Presented to the Division of Nursing Faculty
of the College of Pharmacy and Health Sciences
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of the Requirements for the Degree
Master of Science in Nursing


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by

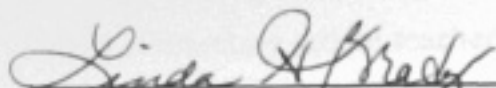

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KNOWLEDGE OF DIABETES
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An Abstract of a Thesis by

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The purpose of the study was to examine the level of knowledge of diabetes among elementary school teachers.

Procedure

This descriptive study obtained data from a random sample using a survey approach. A Demographic questionnaire and a Diabetes Knowledge Test for School Personnel were mailed to 200 teachers in northeast Iowa. An 89.5% response yielded a data-producing sample of 173 elementary school teachers. Based upon an adequate level of knowledge at 75% (21 correct) only 32 (18.6%) of the teachers demonstrated an adequate knowledge level.

Conclusions

This study substantiates the belief that the level of knowledge of diabetes among elementary school teachers is inadequate. Additional data

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are needed to determine if this is representative of other areas in the country.

Recommendations

Replication of the study with suggested revisions are indicated. Exploring other chronic illnesses and teachers' knowledge in those areas still needs to be addressed.

I would like to thank to my husband, Steven, my daughters, Erica and Stephanie, and my father Ruben, for their love, support, and encouragement during the many years I have pursued higher education.

Without the assistance and motivation, this study would have never been completed.

I would like to dedicate this in memory of my mother, Lucyda, who passed away this past January. Lastly, I appreciate all the teachers who responded to the survey and contributed to the success of the study.

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Chapter I

Introduction

"Our desperate chore is to learn to live as well as we can, as soon as we can, in spite of our chronic illness ... Ultimately, we must learn instead to have faith in ourselves and to do the best we can, as often as we can, one day at a time" (Pitzele, 1985, p.4).

Chronic illness affects a vast number of children each year throughout the world. Siegal (1987) reports that approximately 10-20% of children in the United States live with a chronic illness. During the past 20 years, chronic childhood illness has increased substantially with approximately 10%, or one million of these children, having diseases so severe that their daily life activities are greatly affected (Yoos, 1987). With advancing medical and technological progress, the number of students entering school with a chronic illness continues to escalate. Some of these children require special medications or treatments. In fact, a survey conducted by the Iowa Department of Education and Child Health Specialty Clinics at the University of Iowa in 1989 found almost 600 special health care procedures were required daily in Iowa schools (Nelson, 1991). Since increasing

numbers of chronically ill children attend school, this presents increasing challenges for both the teachers and health care professionals.

According to Pless and Pinkerton (1975), a child's chronic illness is a health condition that interferes with his/her usual activities on a daily basis for at least three months a year, leads to a hospital stay involving at least one month a year or, at the time of diagnosis, is expected to meet one of those criteria. Diabetes is one such chronic illness that affects children of all ages. It is characterized by hyperglycemia associated with abnormalities in carbohydrate, fat, and protein metabolism accompanied by renal, ocular, neurologic, and premature cardiovascular diseases (American Diabetes Association, 1988). There are basically three types of diabetes: insulin-dependent (Type I) diabetes, non-insulin-dependent (Type II) diabetes, and other types of diabetes resulting from specific conditions or syndromes. Diabetes mellitus occurs in about 2-10% of the entire population with about 5% of all diabetes being diagnosed in childhood (Avery & First, 1989). According to the American Diabetes Association (ADA) in 1988, the incidence of Type I diabetes accounts for approximately 3% of all new cases diagnosed each year in the United States. In individuals under the age of 20, the annual incidence is 15 per 100,000 or one new case per 7,000 children. Therefore, Type I diabetes is three-four times more common

than chronic childhood diseases such as cystic fibrosis, juvenile rheumatoid arthritis, peptic ulcer, or leukemia and nearly tenfold more common than nephrotic syndrome, muscular dystrophy, or lymphoma (ADA, 1988). The peak years of incidence for Type I diabetes are at approximately six through 12 years of age (Kohrman, Netzloff & Weil, 1987). In fact, current estimates are that diabetes affects nearly one in every 600 school-aged children (LaPorte & Tajima, 1985).

With diabetes affecting one out of every 600 school-aged children, the school teacher may encounter a child having either a hypoglycemic reaction or experiencing hyperglycemia. Hypoglycemia results when blood glucose levels drop too low and is characterized by symptoms ranging from tremors, palpitations, sweating, and excessive hunger to moderate symptoms of headache, mood changes, irritability, decreased attentiveness, and drowsiness. A severe reaction would produce unresponsiveness, unconsciousness, or convulsions with severe reactions occurring in approximately 10% of Type I patients each year (ADA, 1988). Having a hypoglycemia reaction may interfere with a child's mental or physical ability such as taking an exam or riding a bicycle with repeated episodes causing damage to the central nervous system. Besides the medical

effects of hypoglycemia, it could also cause the child to experience embarrassment leading to emotional stress (ADA, 1988).

On the other hand, hyperglycemia, or high blood sugar, can lead to ketoacidosis, which is characterized by severe disturbances in protein, fat, and carbohydrate regulations resulting from insulin deficiency (ADA, 1988). A student with hyperglycemia may complain of abdominal pain, nausea, vomiting, or blurred vision; other symptoms may include thirst, dry mouth, frequent urination, tiredness, and weight loss. The classroom teacher may attribute these to another illness outbreak occurring in the school, when the underlying cause is diabetic ketoacidosis (Haig, 1992).

Purpose of the Study

The purpose of this study will be to determine the level of knowledge of diabetes among elementary school teachers. This study will be designed to answer the following research question: What is the level of knowledge regarding diabetes among elementary school teachers in the Area Education Agency, District VII of northeast Iowa?

Definition of Terms

For the purpose of this study, the following definitions will be used:

Diabetes: Chronic illness characterized by hyperglycemia with abnormalities in carbohydrate, fat, and protein metabolism.

Elementary School Teacher: A teacher instructing students from kindergarten through grade eight. This information will be determined by self report on the demographic questionnaire.

Diabetes Knowledge: Defined as level of knowledge of diabetes. The Diabetes Knowledge Test for School Personnel (Melchionne, 1990) was used to measure the level of knowledge of diabetes in elementary school teachers.

Adequate Knowledge of Diabetes: Defined as a score of 75% correct on the Diabetes Knowledge Test for School Personnel (Appendix A).

Significance of the Study

This descriptive study will add to the body of knowledge pertaining to children with diabetes in the classroom of elementary teachers. The results of this study could be used to demonstrate the need for diabetic education in the schools. This education could be instituted through pamphlets, videotapes, or inservice forums. In addition, data obtained by this study could prove beneficial by applying it to other chronic childhood diseases.

Through these research findings, the need for further education of teachers could become more apparent. Thus, these educational needs could be addressed by school nurses, community health nurses, or diabetic nurse educators. Increased knowledge of diabetes and the ability to spot

emergencies could improve the diabetic child's school performance. In fact, a study by Ryan, Atchison, Puczynski, Puczynski, Arslanian, and Becker (1990), in children 11 to 18 years of age, indicated a decrease in mental efficiency following hypoglycemia even after euglycemia was restored. Informed teachers could also apply knowledge such as this in drivers education classes where rapid responding and decision making are required by allowing students with diabetes an alternative time to drive.

The data from this study could also be used to expand the educational curriculum in preparing the teacher to assist students with chronic illness in the classroom. With increasing emphasis on cost containment and mainstreaming students, data from this study could be utilized to develop more comprehensive teacher preparation courses to meet that need.

Indeed, the data generated from the study, along with proposed increased knowledge through education, could also assist the child in attaining better compliance with the disease. In addition, the results of this study may prove useful to future researchers as they develop educational materials to meet the need for increased diabetic education. Knowledge remains a cornerstone in the provision of quality education by assisting the teacher with the diabetic student to attain his or her ultimate performance.

Chapter II

Review of the Literature

This chapter will review what has been reported in the area of diabetic knowledge of elementary school teachers. This begins with a discussion of the physical and psychological development of the school-aged child, followed by discussions of diabetes and implications for education of the chronically ill child, and concludes with current studies of knowledge of diabetes of elementary school teachers.

School-Aged Child

Since diabetes affects one out of every 600 school-aged children, it becomes essential to understand the needs of the school-aged child and the impact diabetes can have upon his/her growth and development. Since school-age has been loosely applied in various texts, two more definitive periods will be utilized - middle childhood and late childhood. Middle childhood refers to kindergarten through third grade or between the ages of 4½ and 8 with late childhood occurring from about 8-12 years of age (Mott, James & Sperhac, 1990).

During middle childhood, the average weight gain is five pounds per year and average annual height increase is two inches (Mott, James & Sperhac, 1990). Since growth is steady, nutritional intake must meet the

metabolic needs to facilitate optimal growth and development. Cognitive development is a transition from the limited and illogical thinking of early childhood to more logical patterns of late childhood. Piaget and Inhelder (1969) describes children ages 4-7 as in the intuitive stage with children being able to distinguish between their own perception of the real world and the reality of the physical and social environment.

For the developmental theorist Erikson (1963), the child's psychosocial development is a continual interactive process of several stages that focuses on the relationships between physical and emotional variables during the individual's lifetime. According to Erikson (1963), the age of 3-6 years is the stage of initiative versus guilt and is characterized by vigorous intrusive behavior, enterprise, and a strong imagination. During this time period, a conscience develops while children learn to take responsibility for their behavior. On the other hand, guilt appears when a child's activities or questions are belittled or unanswered, resulting in a sense of passivity or low self-esteem. In fact, a study by Coopersmith (1967) found that there was a positive correlation between family experiences and the development of high self-esteem during childhood. Thus, middle childhood begins with a movement away from home and family with shifts toward school, peers, and community. As this shift occurs, teachers take on many of the roles

formerly assumed by parents while serving as models with whom children identify (Whaley and Wong, 1989).

Then, late childhood emerges as a dynamic, complex process where the norm is marked by individuality. Physically, the average weight gain for both girls and boys is 6.5-8 pounds per year and the average height gain is 2-2.5 inches per year prior to a girl's growth spurt at around age 10 (Mott, James & Sperhac, 1990). As children spend more time outside the home, they begin to determine their own nutritional needs. If left unsupervised, children may develop poor eating habits and snack on high-carbohydrate, high-fat items.

Cognitive development changes as a transition occurs in thinking and problem solving. Piaget terms this stage as concrete operations. During this stage the child is able to represent mentally what has been perceived and is able to view self and actions objectively (Piaget & Inhelder, 1969). Erikson (1963) describes his fourth stage of development (ages 6 to 12) as industry versus inferiority, where a child masters particular tasks and completes projects. Children want to be recognized for their accomplishments, and if unsuccessful, may develop in a sense of inferiority. In fact, in studies done by Brown (1985); Hauser, Pollets, Turner, Jacobson, Powers, and Noam (1979); and Sullivan (1978), it was found that

low self-esteem, social dependency, and poor ego development were more prevalent among children with diabetes than among their healthy peers. However, late childhood provides many opportunities for the individual to become self-reliant.

Diabetes

Type I or insulin-dependent diabetes mellitus (IDDM) has its onset most commonly in childhood. The disorder is characterized by a deficiency of the hormone insulin which is necessary for carbohydrates to be metabolized correctly. Lack of insulin is secondary to destruction of beta cells in the pancreas. IDDM occurs when beta cells within the islets of Langerhans are damaged or reduced causing an absence or decrease in circulating insulin. Once this begins, glycogenolysis, or the breakdown of stored glycogen into glucose, occurs with the additional glucose becoming released into the circulation (Mott et al., 1990).

Although the causes of IDDM are not completely understood, a variety of mechanisms may be responsible for its development. A viral infection was suggested by Lipman (1988) to be a preceding cause since diagnosis of diabetes increased during the winter months. Nemchik (1982) suggested that a genetic predisposition and human lymphocyte (HLA)-directed response to viral infections may lead to beta cell destruction. However, the

current theory is that an autoimmune process is involved where the presence of HLA genes causes a defect in the immune system and renders it susceptible to viral infections (Whaley and Wong, 1989).

With insulin being needed for metabolism, a decrease has a multitude of effects on various functions within the body. Blood glucose levels increase leading to hyperglycemia. Polyuria (excessive urination) occurs when the serum glucose exceeds the renal threshold for maximal reabsorption of glucose. As water loss occurs, this results in dehydration and an increase in serum osmolality leading to polydipsia or thirst (Mott et al., 1990). Since carbohydrates cannot be metabolized properly, fat and protein are used for energy which results in an increased appetite (polyphagia). Despite an increased caloric intake, weight loss occurs.

While fat is used for energy, free fatty acids increase in the bloodstream and the liver converts those to ketone bodies. With the absence of insulin, the plasma concentration of counter-regulatory hormones (epinephrine, growth hormone, cortisol, and glucagon) increases further impairing metabolism (Sperling, 1982). As ketoacids accumulate, metabolic acidosis occurs along with compensatory deep breathing (Kussmauls respirations) as the body attempts to excrete excess carbon dioxide. This results in the characteristic fruity acetone breath noted in

children. If these conditions are not alleviated, electrolyte imbalance, dehydration, acidosis, coma, and even death result (Mott et al., 1990).

In addition to the ketoacidosis described previously, there are also a variety of potential complications associated with the long-term effects of diabetes which involve both small (microvascular) as well as large (macrovascular) blood vessels. Some of the microvascular complications are retinopathy, nephropathy, and neuropathy. Microvascular complications occur through the process of glycosylation where proteins from the blood become deposited in the walls of small vessels and become trapped by glucose compounds. A continuing build-up of these substances over a period of time causes narrowing of the vessels with an interference of microcirculation to those areas. Some vascular changes occur within 2½-3 years after diagnosis in individuals with poor control (Whaley and Wong, 1989). Macrovascular complications include coronary heart disease, peripheral vascular disease, and cerebrovascular disease. Other associated complications are growth abnormalities and limited joint mobility (LJM). Each of these complications will be discussed as they affect the child with diabetes.

Since diabetic retinopathy is one of the most common causes of blindness, children need continual evaluation. In individuals with IDDM

diabetes, retinopathy rarely occurs before the fifth year of the disease but reaches a prevalence of 50% by the 10th year. By the 15th year, 50% of individuals have proliferative retinopathy where new blood vessels are formed, extending from within the retinal substance onto the surface of the retina or into the vitreous cavity (ADA, 1988). Besides diabetic retinopathy, approximately 30-40% of IDDM individuals will develop nephropathy involving end-stage renal failure, and require dialysis. Strokes Diabetic nephropathy is characterized by proteinuria, hypertension, edema, and renal insufficiency (ADA, 1988). According to Spies (1983), there is some evidence that excellent glucose control may slow renal disease.

The other microvascular complication that often accompanies IDDM is neuropathy. Diabetic neuropathy is a set of clinical syndromes that becomes prevalent with the duration and severity of hyperglycemia. In IDDM individuals, neuropathy rarely occurs within the first five years after diagnosis (ADA, 1988). It is primarily characterized by diffuse and focal painful and painless neurological deficits in the peripheral nervous system and widespread autonomic dysfunction. In individuals with chronic neuropathy, a late complication of the foot is ulcerations, which may appear due to a loss of sensation in the feet and often leads to non-traumatic amputations (ADA, 1988).

Besides the microvascular complications that occur with diabetes, macrovascular complications also occur. The most common are coronary heart disease, peripheral vascular disease, and cerebrovascular disease. In IDDM individuals, the mortality rates are more than 11 times greater than among individuals of the same age without diabetes (ADA, 1988). Approximately 25% of deaths among patients with the onset of diabetes prior to age 20 is caused by atherosclerotic cardiovascular disease. Strokes account for 6% of deaths under 45 years of age and heart disease causes 27% (ADA, 1988). Thus, macrovascular complications tend to occur at an earlier age and be more extensive as well as more severe in individuals with diabetes.

Another identified risk factor with diabetes is lipid abnormalities which occur in 25-75% of adults, adolescents, and children with diabetes. Elevated cholesterol levels and high ratios of total cholesterol to high-density lipoprotein cholesterol are risk factors for cardiovascular disease and are often elevated in IDDM individuals, especially in those with poor metabolic control. Hypertension is also another major risk factor, and in surveys of people 20-44 years of age, 29% of those with diabetes (compared to only 8% of those without) report having hypertension (ADA, 1988).

Less common subtle complications are those affecting growth and development. Approximately 5-10% of IDDM youngsters have a lag in height or weight when compared to established population growth curves. Those most likely affected are those with the earliest onset of diabetes and poorest control with boys having two to three more times the growth abnormality than girls (ADA, 1988).

The last complication of diabetes that will be addressed is LJM. LJM is actually a clinical marker for other severe complications such as retinopathy, nephropathy, neuropathy, and other disorders. It is characterized by a scleroderma-like stiffness of the skin and joints and may occur in children or adults (ADA, 1988).

Implications for Education of the Chronically Ill

Individuals with chronic health conditions have special educational needs which have been addressed through legislation for the handicapped. From 1827 and the passage of Public Law (PL) 94-142 in 1975, Weintraub, Abeson, Ballard, and LaVor (1976) identified 195 federal laws enacted specific for the handicapped. Sixty-one of those laws were passed from March 1970 through November 1975. During 1974, 36 federal bills which affect either directly or indirectly the handicapped and gifted were signed

into law (LaVor, 1976). Two major laws have affected educational practices for children and will be described.

Public Law (PL) 93-380, the Education of the Handicapped Amendments of 1974, was established to extend the Elementary and Secondary Act of 1965. One of its main points was that it established national policy on equal educational opportunity. Primarily, PL 93-380 set forth provisions of equal educational opportunity for every citizen without financial barriers. Then PL 94-142, the education for All Handicapped Children Act of 1975, was passed as an amendment to PL 93-380 and provided a free, appropriate education for all handicapped, regardless of how seriously they might be handicapped. It also described the type of student for whom funding is available:

Handicapped children means those children evaluated as being mentally retarded, hard of hearing, deaf, speech impaired, visually handicapped, seriously emotionally disturbed, orthopedically impaired, other health impaired, deaf, blind, multihandicapped, or as having specific learning disabilities, who because of those impairments need special education and related services (Sec. 121 a.5).

For the IDDM individual, this law refers to health-impaired students who

suffer from illnesses or diseases that affect the operation of various organs of the body (Taylor & Sternberg, 1989). Besides diabetes, some of the associated conditions are heart conditions, asthma, cystic fibrosis, cancer, and juvenile arthritis. Thus, for the IDDM individual, the law means that schools are to provide for specific health-related needs that would interfere with normal school participation. For example, the IDDM child may require blood glucose monitoring, insulin injections, or snacks between meals. PL 94-142 dictates that it is a school's obligation to provide such services. In litigation involving Irving Independent School District versus Tatro (1984), the issue of related services was brought before the Supreme Court. Amber Tatro was a 3-year-old girl with spina bifida attending an early childhood development program. With residual neurological and orthopedic problems, she required a catheterization procedure in order to avoid kidney damage. The school refused to do the procedure; however, the Supreme Court supported Tatro because they felt the procedure was a related service and without it she could not attend school.

Basically, the provisions of PL 94-142 require schools to 1) identify and evaluate children with appropriate conditions; 2) develop individual educational plans; 3) implement due process; 4) provide related support services to enable children to benefit from education; and 5) determine

appropriate classroom placement within the least restrictive environment (Weintraub & Abeson, 1976). Although the provisions of PL 94-142 are fairly clear, teaching a child in the least restrictive environment has led to many implications. For example, PL 94-142 became the impetus for making the regular educator a participant in special education. In fact, the United States Office of Special Education and Rehabilitation Services in the U.S. Department of Education issued the "Regular Education Initiative" whose purpose was to find ways to serve students classified as having mild and moderate disabilities in regular classrooms by encouraging a partnership between regular and special education (Will, 1986). By integrating the handicapped child into the regular classroom, mainstreaming flourished and regular classrooms became more heterogenous (Forest, 1987; Stainback & Stainback, 1988; Strully & Strully, 1985). However, sometimes the manner in which PL 94-142 was implemented had a negative impact upon the child with IDDM. In a case report described by Gray, Golden and Reisweig (1991), a request for health-related support services for blood glucose monitoring was made on behalf of two school-aged children. One child had difficulty recognizing symptoms of hypoglycemia and the other had severe episodes. Blood glucose monitoring was recommended and training offered to the school

staff. First, school administration refused to provide the service until several conferences were held with parents and diabetes care staff. However, they insisted only nurses do blood testing and insisted the children take placement tests for learning disabilities to qualify for health-related support services. According to PL 94-142, it is not necessary to be labeled with a learning disability to qualify for funds, and lack of resources does not relieve the school of its obligation to provide services. Neither of these children were learning disabled, but the school would receive more federal dollars for children who were learning disabled. the teacher would

According to Hobbs (1974), there are both positive and negative effects of labeling. Labeling can result in improved legislation regarding handicapped along with increased communication among professionals. However, individuals such as those cited in the previous example can also be mislabeled, stigmatized, and suffer peer rejection from improper usage of labeling. Therefore, public schools must consider the welfare of the child when applying these and seek labels that best meet the student's special needs.

According to Taylor and Sternberg (1989), the regular educator within the classroom has a four-fold commitment to students with health impairments. First, the teacher must acquire information and be aware of

the characteristics of the disorder. For example, the teacher can become aware of symptoms of hypoglycemia for the IDDM individual and encourage blood glucose monitoring prior to appropriate treatment. Secondly, the teacher should be aware of the effect health impairments have on school schedules. For the IDDM individual, consistency in scheduling could allay the potential for insulin reactions. Thirdly, the teacher needs to be aware of the effect of the health impairment on the student's psychological being. By being sensitive to the daily difficulties facing the student and effects on their peers and family, the teacher would be better prepared to deal with those possibilities. Lastly, Taylor and Sternberg (1989) identify the commitment of appropriate expectations. Generally, expectations for health impaired students should be similar to those without health impairments.

As mainstreaming continues, greater responsibilities will be delegated to regular classroom teachers. How they handle this will depend upon many variables. One of these is their perception of the various handicapping conditions. According to Williams (1977), physically handicapped children were consistently rated as most acceptable for mainstreaming by regular classroom teachers. Another factor is the teacher's educational preparation which typically includes the following:

1. General education - courses providing a broad education in art, music, history, government, science, mathematics, communication, and other areas of study.
2. A major - in-depth study of subjects commonly taught in public school curriculum, and may be spread over a number of subject fields.
3. Professional education courses - courses preparing students for teaching such as the history and philosophy of education, school curriculum, and methods of teaching (Abruscato, 1985).

Willingness by regular classroom teachers to accept handicapped children in their classes has also been significantly related to the number of special education credits accrued (Mandell & Strain, 1978; Ringlaben & Price, 1981; Stephens & Braun, 1980). In a study done by Ringlaben and Price (1981), 86% of the respondents in their study had no special education coursework.

With schools having increasing budget concerns, school nurse programs have been decreasing. In fact, a survey conducted by the Iowa Department of Education and Child Health Specialty Clinics at the University of Iowa in 1989 found only 41% of the schools surveyed in Iowa had registered nurses available 25% or less of the time. Of the 873 surveys returned, only

14% had registered nurses available more than 75% of the time (Nelson, 1991). Therefore, the responsibility of the health impaired child may remain with the teacher.

Research Studies

Although there is a substantial amount of literature on various aspects of diabetes, there is a limited amount of research on chronic illness. Burke and Roberts (1990) conducted a review of studies between 1980 and 1987 concerning the care of chronically ill and disabled children and their family from selected nursing journals in order to determine the existence of research in building a knowledge base for practice. Over 234 articles with relevant titles were scanned, but only 50 of the articles were judged to be research studies. With limited research articles in the journals on chronically ill children, the authors' recommended inclusion of more population-based descriptive studies.

Since children spend a considerable amount of time at school, it would be reasonable to expect teachers to have a basic knowledge of diabetes so that a child with problems could be managed effectively. However, a study done by Frankel (1970) in Israel found that most teachers received very little information about their diabetic students and over 90% of their knowledge was regarded as superficial. Frankel also studied 52 diabetic

children and compared them with 52 control subjects. He found that the diabetic children performed poorer academically and had increased absenteeism when compared with the control group.

In a study in Cuba, Alvisa, Barroso, Guell, Marquez, and Mateo-de-Acosta (1974) found only 36% of teachers understood the nature of diabetes. Twenty-one percent understood its social implications and only 16% would have been able to render adequate emergency care. This reinforces the importance of examining teachers' current knowledge base of diabetes. A similar finding was noted by Ludvigson (1977) in Sweden which revealed inadequate knowledge of diabetes and the management of hypoglycemia. The investigation was conducted on 308 staff members, 255 of whom had regular contact with diabetics, while 53 were teachers in classes without diabetic children. Only five (1.6%) refused to participate. A questionnaire covering 43 questions was distributed to the subjects. The questionnaire examined general knowledge, attitudes to diabetes, and general questions about diabetics outside of school. However, only the school nurses were believed to be motivated to answer so many items, so fewer questions were given to the other school staff. The nurses also answered the questionnaires with an interviewer present while the other staff members were not supervised and may have had access to literature

or communication with other persons. Of the class teachers with diabetic pupils, over 60% had insufficient knowledge (less than 50% of the maximum points) and over 70% of those class teachers without diabetics had insufficient knowledge. This study validates the importance of examining teachers' current knowledge.

A study by Lindsay, Jarrett, and Hillam (1987), in Utah, was conducted to determine teachers' areas of strengths and weaknesses related to dealing with the diabetic child. Approximately 475 teachers (59%) responded of the 800 teachers contacted to a 32-point questionnaire. Only 54% of the group recognized the cause of diabetes and only 23% realized that children needed insulin injections for treatment. The survey mentioned no pilot study and no reliability or validity indices were discussed regarding the self developed questionnaire. There were also a mixture of questions with either true/false, or multiple choice with some having more than one correct answer.

In 1989, a study by Anderson, Hess, and Hiss examined over 529 teachers in four Michigan communities regarding knowledge and attitudes of elementary and junior high school teachers regarding diabetes. The reliability of the 15-item test was .58 with the overall mean score for the group at 58%. Of the teachers surveyed, 43% reported having access to a

school nurse but only 18% reported that the nurse was available for consultation related to diabetes and just 4% said the nurse provided treatment for diabetic children and/or diabetes related in-service education for teachers. This study implied that teachers have serious knowledge deficits and schools do not routinely provide help to teachers of children with diabetes. However, this was a local sample so it may not have been representative nationally. Also, Michigan has several statewide diabetes resources so that may have produced an even higher result on the survey than normal (Anderson et al., 1989). Another concern with this study was the low reliabilities of the knowledge and attitude measures.

In a study done by Melchionne (1990), as reported at the 1990 American Association of Diabetes Educators Convention, 1,785 surveys were sent to teachers randomly selected within the New Jersey school district. Of those, 573 were returned and less than 20% received a score of 75% or better on the Diabetes Knowledge Test for School Personnel (DKTSP). The questionnaire was first evaluated by an expert panel of physicians and nurses prior to the pilot study involving 45 teachers. Upon the return of that information, the DKTSP was revised to a 28-item test consisting of multiple choice items with a stem and four choices. In the actual study done, an alpha reliability coefficient of .86 was obtained.

Since this survey was conducted in the highly urban school district of New Jersey, further validation of the study needs to be examined in a more rural area.

Qualitative research design was used to examine the level of knowledge and understanding of elementary school teachers. This design was selected because the researcher would describe and document the various aspects of the knowledge held among elementary school teachers regarding the use of technology within the classroom. A questionnaire with a revised Delphi method was used. The Delphi Design Method (Dillman, 1978) is a noninteractive method. The Delphi Design Method (TDM) consists of identifying each step in the survey process that may affect the validity of the data. The researcher would make sure in such a way to obtain the best possible response. Therefore, the survey efforts must be organized so that the design process is carried out in detail. Specifics of applying the TDM will be addressed in the following chapter. By surveying a wide range of elementary school teachers in the urban school district, the researcher can determine the level of knowledge and understanding of technology within the classroom.

Chapter III

Methodology

A descriptive survey research design was used to examine the level of knowledge of diabetes among elementary school teachers. This design was selected so that the researcher could describe and document the various aspects of the knowledge base among elementary school teachers regarding diabetes. This study will utilize Melchionne's questionnaire with a revised demographic portion based on the Total Design Method (Dillman, 1978). According to Dillman, the Total Design Method (TDM) consists of identifying each part of the survey process that may affect the quality or quantity of the response and mold them in such a way to obtain the best possible responses. Secondly, the survey efforts must be organized so that the design intentions are carried out in detail. Specifics of applying the TDM will be addressed in the following sections. By surveying a more rural state, it is the intent to provide data that could be more readily generalized. Thus, assessing the level of knowledge of diabetes among teachers becomes a valuable tool toward the ultimate goal of providing quality care for the chronically ill child.

Sample

The target population was all elementary school teachers in the state of Iowa. The accessible population was elementary teachers instructing grades kindergarten through eight at Area Education Agency School District (AEA) VII in northeast Iowa.

Criteria for inclusion in the study were teachers who:

1. were teaching in kindergarten through grade eight.
2. taught in AEA VII School District.

In addition, the teachers:

1. consented to participate in the study.
2. were literate in the English language in order to complete the study.

A computerized list was obtained from the Iowa Department of Education to verify kindergarten through grade eight teaching assignments in the AEA VII School District. Once the list of potential names was finalized, consecutive numbers were assigned using a random number table until 200 teachers were identified as the invited sample. A sample of 20 teachers was chosen randomly to pilot the questionnaire utilizing the same technique as described for the actual study and were eligible to participate in the major study if selected again.

Instruments

Diabetes Knowledge Test for School Personnel (DKTSP)

The DKTSP developed by Melchionne (1990) was used for the study (See Appendix A). Permission was requested and obtained to use this instrument. The DKTSP is a 28-item test consisting of multiple choice items with a stem and four choices. A pre-test alpha reliability coefficient for a study by Melchionne in 1990 was .83. Of the 1,785 surveys sent, 573 were returned and a test retest reliability coefficient of .86 was obtained. In Melchionne's (1990) study, the content validity of the DKTSP was evaluated by two physicians and a nurse.

Demographic Questionnaire

This questionnaire was developed by this researcher (See Appendix B) based upon Dillman's (1978) recommendation for creating survey instruments to be used as part of the Total Design Method (TDM). A thorough review of the literature guided in the development of the questionnaire. The resulting 14-item questionnaire was utilized in the study.

According to Dillman (1978), the TDM principles are based on identifying how each specific aspect of the questionnaire affects the individual's decision to participate. Arrangement of the questionnaire must

be aesthetically pleasing and each step relies on personalization so that it seems easy to motivate individuals to complete it. Also, questions must be worded precisely and pages must be constructed so that items or sections are not skipped when individuals complete the questionnaire. For example, questions are distinguished from answer categories by use of lower and upper case letters with lower case letters always reserved for questions which are usually longer than answers. This provides greater readability (Dillman, 1978). Answer categories are generally preferred over blanks or boxes so that assigning a number provides a more convenient method of precoding for statistical analysis. Numbers are placed to the left of the answer categories to decrease the chance for error and to help ensure individuals will circle the answer they want to indicate. According to Dillman (1978), the same numbers are assigned to the same category so consistency is maintained.

Another recommendation by Dillman (1978) is the establishment of a vertical flow. This prevents omissions as sometimes occurs when individuals must go back and forth across the page in answering the questionnaire. This design also enhances the individuals feeling of accomplishment as each question means moving further down the page (Dillman, 1978).

By providing clear directions on how to answer questions, fewer ambiguous markings result (Dillman, 1978). The same marking procedure should be used throughout the questionnaire and directions should be repeated for most questions if respondents are asked to circle more than one answer and in other cases to circle only one (Dillman, 1978).

In addition to the questionnaire, a cover letter (Appendix C) and two follow-up correspondences (See Appendix D & Appendix E) were developed by this researcher based upon recommendations by Dillman (1978) for use with the Total Design Method (TDM) for mail questionnaires. According to Dillman (1978), the cover letter is the first part to be examined by the individual and serves to introduce the survey and thus, motivate him/her to pick up the questionnaire, fill it out, and return it (Dillman, 1979). The first paragraph of the letter is designed to discuss what the study is about and convince the individual that it is useful while the second paragraph convinces that his/her response is important and no one else's can be substituted. Then, the third paragraph promises confidentiality while describing the use of an identification numbering system. The fourth paragraph reemphasizes the justification for the study and allows individuals a copy of the results of the study. Dillman (1978)

also suggested a means for contacting the researchers with any questions (Dillman, 1978).

The first follow-up in the TDM (Dillman, 1978) was a postcard (Appendix D) which was sent one week after the original mailing. A postcard was sent for both convenience of the researcher and the respondent. The first paragraph states that a questionnaire was sent and to thank those who have completed and returned their surveys and to remind those who have not to respond as soon as possible. The second paragraph thanks those who have returned their questionnaires and stresses its importance to those who have not by asking them to do so immediately. The last paragraph is an invitation to replace the questionnaire if lost or discarded and closes with the researcher's name, title, and ball-point pen signature (Dillman, 1978).

The second follow-up in the TDM was a letter (Appendix E) that was sent three weeks after the first mailing. According to the TDM, this letter should have a tone of insistence that the previous contacts lack. It opened by informing the individual that his/her questionnaire was not received and reinforced that the individual was important to the study. This letter communicates to the respondent that he/she is receiving individual attention and also the social usefulness of the study. The second follow-up

was accompanied by a replacement questionnaire, note of appreciation, and ball-point pen signature (Dillman, 1978).

Procedure

Pilot Study

A pilot study was conducted with 20 teachers completing the DKTSP, (Appendix A) and Demographic Questionnaire (Appendix B) following approval of the research proposal from the Human Subjects Research Review Committees at Drake University. The TDM by Dillman (1978) was used for the pilot study to determine a projected response rate. A cover letter (Appendix F) was sent to the pilot participants explaining information in preparation for the actual study. A response form (Appendix G) was included to determine any concerns on the actual survey before returning it to the researcher. A postcard (Appendix H) was sent to all individuals involved in the pilot study along with a note of appreciation following return of the survey two weeks after the initial mailing. In addition, the pilot study determined the clarity of the cover letter, follow-up correspondences, and the survey forms. Information obtained during the pilot study was utilized for changes prior to implementation of actual study. These changes will be described in Chapter IV.

Actual Study

Once the random selection of 200 subjects had been obtained from the computerized listing, survey packages were coded with identification numbers with a master list held by the researcher. According to Dillman (1978), by using identification numbers this lowered costs and ensured only one questionnaire was returned per respondent (Dillman, 1978).

Since timing is considered critical with TDM (Dillman, 1978), the initial package of the original cover letter (Appendix C), DKTSP (Appendix A), Demographic Questionnaire (Appendix B), and a self-addressed, stamped return envelope was followed exactly one week later by a postcard (Appendix D) sent to all recipients of the first mailing. Each cover letter was signed individually thus emphasizing the personalization of the TDM method. A second follow-up (Appendix E) was mailed to non-respondents exactly three weeks after the original mailing. That follow-up consisted of a second cover letter (Appendix E), replacement questionnaires (Appendix A & B), and another return envelope. All mailings were by first-class postage.

The third and final mailing included a second individually typed, personally signed cover letter, another copy of the survey instruments, and a self-addressed, stamped return envelope. That package was mailed three

weeks after the initial mailing in a hand-addressed envelope using first-class postage. That mailing was sent to any individual who did not respond to the previous mailings.

Ethical Considerations

Approval was granted from the Human Subjects Committee of Drake University. Subjects were informed of the nature of the study and use of the data. They were also informed that their participation was strictly voluntary and that they could have withdrawn at any point by calling the researcher and referring to the code number on the questionnaire. Subjects were assured that their confidentiality was protected since all return correspondence was labeled by code numbers. Names were not placed on the questionnaires.

Anonymity was not possible due to the need to follow up on nonrespondents in the mail survey. Upon return of the questionnaires, data was compiled and entered into a computer (frequency tables are found in Appendix I). Upon completion of the study, the data were destroyed. The findings of the study were made available to the subjects if they requested results.

Chapter IV

Analysis of Data

Introduction

The purpose of the study was to examine the level of knowledge of diabetes among elementary school teachers in the AEA VII School District. In this chapter, the pilot study is described followed by a description of the actual study with the results of the Diabetes Knowledge Test for School Personnel. In addition, there is a discussion of the demographic data and scores received on the DKTSP.

Description of the Pilot

Sixteen (80%) of the 20 teachers responded to the pilot survey. Of these, two teachers (12.5%) were from school districts 0-249 in size; five teachers (31.25%) were from districts sized 250-499; one teacher (6.25%) was from a district 750-999 in size; two teachers (12.5%) were from a district sized 1,000-1,499; one teacher (6.25%) from a district size 1,500-1,999 and five teachers (31.25%) from districts greater than 3,500 in size. There were no responses from districts 500-749 and 2,000-3,499 in size. All of the surveys returned were received within three weeks of the initial mailing on January 4, 1993 with exception of one which was received six weeks later.

The average time to complete the survey was 20 minutes. Fourteen (87.5%) of the subjects felt the time required was reasonable. Thirteen (81.25%) of the respondents felt the instructions were clear and concise. However, two (12.5%) indicated that the form should state "circle letter" instead of "circle number" which was changed on the actual study. Another teacher (6.25%) indicated that the Demographic Questionnaire should be downsized to use less space so busy teachers would feel that it would take less time to complete. This suggestion was also implemented in the actual study. One respondent mentioned that instead of the term school system in regards to staffing full or part-time nurses, school building should be listed since many schools' full-time nurses cover several different school buildings. Again, this suggestion was implemented on the actual study. Three (18.75%) requested additional information when the actual study had been completed. The average class size of the respondents in the pilot study was between 15-30 and the average age of those responding was 46, with 14 (87.5%) being female and two (12.5%) being male.

Grades currently being taught were kindergarten (12.5%), first grade (12.5%), second grade (25%), third grade (31.25%), and fifth grade (18.75%). The number of years teaching was 0-4 (6.25%), 5-9 (6.25%), 10-14 (12.5%), 15-19 (37.5%), 20-24 (31.25%), and over 25 (6.25%). None of

those in the pilot study had a child with diabetes in their class at the present time, but 50% of them had contact with a child with diabetes previously.

Ten (62.5%) reported having a family member or acquaintance with diabetes at some point in their lives. Seven (43.75%) had previous education from several sources with the exception of college courses or inservice training. Two (12.5%) had obtained their graduate degrees, 12 (75%) had some graduate work, and two (12.5%) had their bachelor's degree. Only five (31.21%) had a full-time school nurse with 10 (62.5%) having only a part-time nurse. The grade levels taught were from preschool to eighth grade.

Description of the Sample

Of the 200 elementary school teachers invited to be participants in this study, 179 (89.5%) returned their questionnaires. Although raw data was 179 subjects, only 173 (86.5%) were utilized in the final analysis because the data analysis had already been compiled. This response rate was higher than Dillman's (1978) predicted 75% return using the Total Design Method. Eighty-seven (48.6%) of the responses were received within the first week of data collection (See Table 1). Nine (4.5%) teachers enclosed a self-addressed, stamped return envelope requesting a copy of the survey results.

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Insert Table 1 about here

The AEA VII School District consists of 27 school districts in a seven county area consisting of Black Hawk, Bremer, Buchanan, Butler, Chickasaw, Grundy, and Tama. Surveys were returned from within all seven counties.

Characteristics of the Sample

Of the 173 (86.5%) elementary school teachers responding to the study, the size of the school system ranged from 0-3,500 (See Table 2). Eight of the teachers did not mark the size of the school system on the questionnaire.

Insert Table 2 about here

Thirteen (7.5%) of the teachers replying were male and 159 (91.9%) were female with one (0.6%) individual not marking the questionnaire. Ages ranged from 23 to 65 with the median age being 43 years and a mean age of 42.9 years. Two teachers did not mark their age on the questionnaire. The highest level of education ranged from completed

Table 1

Survey Response

Mailings	Number of Surveys Returned	Percent Returned
Initial Mailing (1/25/93)	87	43.5%
First Follow-up Mailing (Postcard) (2/1/93)	51	25.5%
Second Follow-up Mailing (Letter & Survey) 2/8/93	41	20.5%
Total Response	179	89.5%

Note. N = 200.

Table 2

Size of School System

Number of Students in School System	Number of Teachers Responding	Percent
0 - 249	12	6.9
250 - 499	40	23.1
500 - 749	30	17.3
750 - 999	19	11.0
1,000 - 1,499	13	7.5
1,500 - 1,999	5	2.9
2,000 - 3,499	13	7.5
Greater than 3,500	33	19.1
No Data	8	4.6
Total Response	173	100

Note. N=200.

college to a graduate degree (See Table 3). The number of years teaching ranged from 0-25 (See Table 4).

Insert Tables 3 & 4 about here

The size of the classes ranged from 5-30 (See Table 5). The grade levels taught were preschool to grade eight (See Table 6).

Insert Tables 5 & 6 about here

The number of teachers with a child with diabetes in class was nine (5.2%) with 164 (94.8%) not having one in their class. Ninety-five (54.9%) teachers had previously had a child with diabetes in their class while 78 (45.1%) had never had one. Fifty-two (30.1%) had a family member or close acquaintance with diabetes while 121 (69.9%) did not.

Eighty-seven (50.3%) teachers had never had any education regarding diabetes while 85 (49.1%) had some education. Only one teacher (0.6%)

Table 3

Level of Education

Level of Education	Number of Teachers	Percent
Completed College	12	6.9
Some Graduate Work	115	66.5
Graduate Degree	38	22.0
Doctorate	0	0
No Data	8	4.6
Total Response	173	100

Note. N = 200.

Table 4

Number of Years Teaching

Years Teaching	Number of Teachers	Percent
0 - 4	15	8.7
5 - 9	25	14.5
10 - 14	27	15.6
15 - 19	38	22.0
20 - 24	31	17.9
Over 25	37	21.4
Total Response	173	100

Note. N=200.

Table 5

Size of the Class

Size of Class	Number of Teachers	Percent
5 - 10	1	0.6
10 - 15	11	6.4
15 - 20	52	30.1
20 - 25	80	46.2
25 - 30	23	13.3
Over 30	4	2.3
No Data	2	1.2
Total Response	173	100

Note. N = 200.

Table 6

Grade Level Teaching

Grade Level Taught	Number of Teachers	Percent
Preschool	6	2.7
Kindergarten	24	10.7
First Grade	35	15.6
Second Grade	28	12.5
Third Grade	42	18.8
Fourth Grade	36	16.1
Fifth Grade	26	11.6
Sixth Grade	15	6.7
Seventh Grade	6	2.7
Eighth Grade	6	2.7
Total Response	224	100

Note. N=200. Some Teachers taught multiple grades.

did not respond to that question. The teachers had received their information from a variety of sources (See Table 7). The most common information sources were pamphlets, books, and parents. Inservice training and college courses were the least common sources of education for the teachers. Only 28 (16.2%) of the teachers had a full-time nurse available in their building while 108 (62.4%) had a part-time nurse available (See Table 8).

Insert Tables 7 & 8 about here

Major Findings of the Study

The remainder of the data deals with the score of the DKTSP and variables from the Demographic Questionnaire. Of the 28-item DKTSP, scores ranged from 1-27. Data revealed a mean of 15.6, a mode of 16, a median of 16, and a standard deviation of 5.15.

Adequate knowledge was defined as 75% (21) correct on the DKTSP with 32 (18.6%) of the elementary school teachers receiving a score of 21 or greater. The alpha reliability coefficient on the DKTSP was .84.

Table 7

Source(s) of Information

Source	Number of Responses	Percent
Physician	13	5.7
Nurse	37	16.1
Parents	46	20.0
Child	15	6.5
College Course	7	3.0
Inservice Training	12	5.2
Pamphlets, Books	63	27.4
Television	23	10.0
Other	14	6.1
Total Response	230	100

Note. N=200. Several listed more than one source of information.

Table 8

School Building has Nurse

Nurse on Staff	Number of Teachers	Percent
Full - Time		
No	145	83.8
Yes	28	16.2
Part - Time		
No	53	30.6
Yes	108	62.4
No Data	12	6.9
Total Response	173	100

Note. N = 200 .

An analysis of variance using the score of the DKTSP and size of class revealed no groups were significantly different at the 0.05 level ($F = 1.49$, $p = .20$). An ANOVA on the score of the DKTSP and number of years teaching revealed differences, but those were not significant at the 0.05 levels ($F = 1.46$, $p = .21$).

A t-test was done on the score of the DKTSP and the number of teachers currently having a child with diabetes in the class. It was found that there was a significant difference ($t = 2.03$, $p = .04$) between those teachers currently having a child with diabetes in their class and the score they received on the DKTSP. However, only nine teachers currently had a child with diabetes in their class. A similar t-test was done on those teachers who had previously had a child with diabetes in their class and the score on the DKTSP. This revealed a significant difference ($t = 2.44$, $p = .02$). A t-test on the score of the DKTSP and teachers having a family member or acquaintance with diabetes revealed no significant difference ($t = .91$, $p = .36$). However, a t-test comparing the score of the DKTSP and those teachers receiving education on diabetes was significant ($t = 4.14$, $p = .00$). An ANOVA on the score of the DKTSP and the level of education revealed that no group was significantly different at the 0.05 level ($F = 1.63$, $p = .20$). An ANOVA on the score of the DKTSP and

the size of the school system revealed that no group was significantly different at the 0.05 level ($F = 1.16$, $p = .33$).

Summary

An adequate level of knowledge of diabetes among the elementary school teachers of the AEA VII School District was defined as 75% (21) correct on the DKTSP. Thirty-two (18.6%) teachers received a score of 21 or greater. The findings of the ANOVA and t-tests done on various aspects of the demographic information and the scores of the DKTSP lead to few levels of significance. Teachers receiving education on diabetes, those currently having a child with diabetes in their class or previously having a child with diabetes scored higher on the DKTSP.

Chapter V

Discussion of Results

The purpose of the study was to examine the level of knowledge of diabetes among elementary school teachers and to determine if there were any relationships between the score received on the DKTSP and some of the demographic variables. In this chapter, findings and limitations are discussed. Several recommendations for further research and a summary conclude the chapter.

Discussion of Findings

Based upon the response rate, the 179 (89.5%) elementary school teachers represent a population interested in a topic they perceive as important. The fact that only 32 (18.6%) scored 75% (21) or higher on the DKTSP surprised the researcher. It was anticipated that a need exists to educate teachers about diabetes, but it was anticipated that there would be higher scores on the DKTSP. The lower scores may be related to the fact that only nine (5.2%) have a child with diabetes in their class. However, it surprised the researcher that their scores were low since 95 (54.9%) reported they had previously had a child with diabetes in their class. The low scores on the DKTSP do concur with findings of other studies on

diabetes (Frankel (1979); Cuba et al., (1974); Ludvigsson (1977); Lindsay et al., (1987); Anderson et al., (1989); and Melchionne (1990).

As similarly reported by Frankel (1970), this study found most teachers received very limited information about diabetes. While Frankel (1970) found over 90% had superficial knowledge, this study found 50.3% never had any education regarding diabetes while 49.1% had some education. Cuba et al., (1974) found only 36% of the teachers understood diabetes, while this study found only 18.6% had an adequate level of knowledge (score of 75% or greater). A study by Ludvigsson (1977) reported that less than 40% had sufficient knowledge (less than 50% of maximum points). In the study by Lindsay et al., (1987), only 54% recognized the cause of diabetes. This was similar to this study in that 57.8% recognized the cause of diabetes.

Lindsay et al., (1987) reported that only 23% understood the need for insulin in the treatment of diabetes compared to 53.8% in this study. In a study by Anderson et al., (1989), only 43% of the teachers surveyed had access to a nurse, whereas in this study 62.4% had at least a part-time nurse available. The reliability was also significantly higher in the current study (.8412) compared to only .58 in the Anderson et al., (1989) study. In the study by Melchionne (1990), the return rate of the DKTSP was only

32% compared to 89.5% in this study. However, similar to the current study, less than 20% received a score of 75% or better on the DKTSP.

The utilization of the Total Design Method (1978) in personalizing the data collection certainly contributed to the higher response rate. The personalized cover letter conveyed a firm belief that their responses were vitally important to the study. By avoiding mailing during the Christmas season, this may have also contributed to the higher response rate. Even the pilot study which was conducted in early January had an 80% return response rate without any of the follow-up. The actual study had two follow-up communications with an impressive 25.5% and 20.5% return response with each mailing.

The researcher analyzed various components of the Demographic Questionnaire to the scores of the DKTSP. It was anticipated that there would be a difference between the number of years teaching and the score on the DKTSP. Although the scores were slightly higher with the increased number of years teaching, there was not a significant difference. When analyzing the score of the DKTSP in relation to teacher education on diabetes, a t-test did reveal a difference with those having education on diabetes receiving a higher score. Teachers previously or currently having

a child with diabetes in their class also received a higher score on the DKTSP.

Significance of the Study for Nursing

The findings of this study have implications for expanding the body of knowledge pertaining to children with diabetes in the classroom. It does indicate that elementary school teachers have a limited knowledge of diabetes with only 18.6% receiving a score of 75% correct on the DKTSP. The nurse educator working with a diabetic child or the school nurse can take advantage of these findings to provide diabetic education in the school systems. By providing education, nurses could enhance a teacher's knowledge and awareness in the classroom of children with diabetes. With increased knowledge, a teacher could recognize diabetic emergencies earlier and this could improve the child's school performance and assist in maintaining his/her diabetic compliance.

Furthermore, both the teacher and the nurse could utilize these findings to schedule classes to best meet the needs of the child with diabetes. This study could also be used as the basis for development of more comprehensive teacher preparation courses and for the promotion of increased collaboration between the school nurse and the teacher. With the increasing emphasis on budget restraints and mainstreaming students,

the data gained from this study could become a step in furthering education and research on other chronic diseases.

Limitations

The study was conducted recognizing that generalization of the results cannot be applied beyond this population. This investigation examined the level of knowledge of diabetes as adequate at 75% (21) correct. However, the definition "adequate" may have to be re-examined as it applies in the classroom setting.

Recommendations

Based on this study, the following recommendations are made:

1. Replication of this study with a larger sample size. Although the response was very high, the sample size is still small in relation to the number of teachers in Iowa.
2. Revision of the Demographic Questionnaire. Question #2 needs to delineate sizes of classes since there was an overlap in the answers.
3. Consider redefining the term "adequate" when referring to the level of knowledge of diabetes. Perhaps the teachers' mean score of 15.64 is high enough to recognize signs and symptoms of problems in the child with diabetes.

4. Further research using a control group after presentation of a diabetic inservice to teachers to examine if increased learning occurs.
5. Continued use of Dillman's (1978) Total Design Method as it produces a high response rate in data collection.
6. Replication of the study using another group such as school nurses. If teachers rely on the nurse's knowledge, it is imperative they understand diabetes themselves.
7. Additional research on the types of educational sources teachers prefer.

Summary

This study examined the level of knowledge of diabetes among elementary school teachers in the AEA VII School District of northeast Iowa. According to the literature review, there have been few studies in determining the level of knowledge present, especially in a rural state such as Iowa. The findings indicate that there is a need for increased education in the school system. As mainstreaming increases, more chronically ill children will be entering the school system leading to increased responsibilities for the classroom teacher. This is why teachers need to know how to recognize signs and symptoms in the child with diabetes and respond appropriately. Administration should not be limiting the number of nurses but expanding this valuable resource. The nurse plays an

invaluable role in collaboration with teachers in promoting the health of children so they can attain their full potential. Thus, it is imperative that further studies be done whereby nursing demonstrates its ability to be an advocate for the child with diabetes and other chronic illnesses.

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Appendix A

Diabetes Knowledge Test For School Personnel

Directions: Please read each question below and circle the letter of the best answer. There is only one answer to each question. If you are uncertain, circle choice "d." (* Signifies correct answer)

1. Diabetes mellitus is a disease that is of:
 - a. lifelong duration.
 - b. short duration.
 - c. intermittent episodes.
 - d. I do not know.
2. Diabetes mellitus in children is usually a result of:
 - a. over production of insulin by pancreas.
 - b. lack of insulin production by pancreas.
 - c. sufficient insulin production, but insulin is ineffective.
 - d. I do not know.
3. Diabetes mellitus in children is also known as:
 - a. Type I (insulin dependent)
 - b. Type II (non-insulin dependent)
 - c. Type III (receptor site dependent)
 - d. I do not know.

(CONTINUED)

4. Adult onset diabetes differs from childhood onset diabetes in that the adult is usually:
- a. overweight and requires medication by injection.
 - * b. overweight and requires medication by mouth.
 - c. normal weight, no medication required.
 - d. I do not know.
5. In most cases, the treatment of diabetes mellitus in children includes:
- a. diet only.
 - b. diet, exercise, medication by mouth.
 - * c. diet, exercise, medication by injection.
 - d. I do not know.
6. The dietary aspect of treatment of diabetes in children is characterized by a meal plan which attempts to:
- a. restrict weight gain.
 - b. restrict concentrated sweets only.
 - * c. provide for normal growth and development.
 - d. I do not know.
7. The rationale for testing daily blood samples for sugar is to:
- a. prevent the child from "cheating" on his/her diet.
 - * b. evaluate treatment.
 - c. determine the number of calories to be eaten at the next meal.
 - d. I do not know.
8. Hypoglycemia is a condition in which the blood sugar level is:
- * a. low.
 - b. high.
 - c. normal.
 - d. I do not know.

(CONTINUED)

9. Two causes of hypoglycemia are:
- a. too much insulin, lack of food consumed.
 - b. insufficient insulin, lack of food consumed.
 - c. insufficient insulin, too much food consumed.
 - d. I do not know.
10. Signs of hypoglycemia include:
- a. frequent urination, increased thirst.
 - b. hyperactivity, flushed face.
 - c. lack of concentration, pale, clammy skin.
 - d. I do not know.
11. If you have a student becoming hypoglycemic, your response is to:
- a. observe child, no action is necessary.
 - b. accompany the child to get juice immediately.
 - c. call the parents, the child needs more insulin.
 - d. I do not know.
12. Following your treatment of a hypoglycemic reaction, you will:
- a. send the child home.
 - b. seat the child outside the classroom to recuperate.
 - c. stay with the child, evaluate condition in 5-10 minutes.
 - d. I do not know.
13. Another term for hypoglycemia is:
- a. acetone reaction.
 - b. insulin reaction.
 - c. ketone reaction.
 - d. I do not know.

(CONTINUED)

14. Hyperglycemia is a condition in which the blood sugar is:
- a. low.
 - b. high.
 - c. normal.
 - d. I do not know.
15. Two causes of hyperglycemia are:
- a. insufficient insulin, too much food consumed.
 - b. insufficient insulin, lack of food consumed.
 - c. too much insulin, too much food consumed.
 - d. I do not know.
16. You would recognize hyperglycemia by which of the following:
- a. sweaty, pale.
 - b. frequent urination, excessive thirst.
 - c. shaking, incoherent.
 - d. I do not know.
17. If you have a non-diabetic or diabetic student exhibiting symptoms of hyperglycemia, your response would be to:
- a. make your observations known to the student.
 - b. contact the school nurse.
 - c. contact the parents.
 - d. I do not know.
18. The physiological effect of exercise on a well controlled diabetic child is to:
- a. lower blood sugar levels.
 - b. raise blood sugar levels.
 - c. has no effect on blood sugar levels.
 - d. I do not know.

(CONTINUED)

19. The best time for a child with diabetes to have physical education is:
- a. prior to a meal or snack.
 - * b. following a meal or snack.
 - c. two hours after insulin is given.
 - d. I do not know.
20. You observe the child with diabetes in your class trading sandwiches with another student. Your response would be to:
- * a. contact the school nurse to further evaluate the incident.
 - b. remove the child from the cafeteria.
 - c. reprimand both children.
 - d. I do not know.
21. Children with diabetes may experience:
- a. paranoia.
 - b. aggressive behavior.
 - * c. fear of embarrassment.
 - d. I do not know.
22. Snacks are part of the well balanced meal plan for the child with diabetes. They are an essential component because they:
- * a. help prevent hypoglycemia.
 - b. are "free foods" for the child.
 - c. help the child feel "normal."
 - d. I do not know.
23. Typically, you may find the parents of children with diabetes mellitus are:
- a. divorced.
 - * b. over-protective.
 - c. negligent.
 - d. I do not know.

(CONTINUED)

24. Because of the nature of the illness, a child with diabetes mellitus may feel:
- a. the need for a rigid daily schedule.
 - b. able to be self-sufficient by age 10.
 - * c. lack of control over his/her life.
 - d. I do not know.
25. School age children need peer acceptance. To assist a child with diabetes to gain this acceptance you may:
- a. have the child discuss the hospitalization with the class.
 - * b. give the child the option to discuss "diabetes" during health class.
 - c. don't discuss the topic, it is embarrassing for the child.
 - d. I do not know.
26. Class and birthday parties are a social aspect of school. If you have a child with diabetes, how best can you handle this situation?
- * a. discuss with the parents how they wish to deal with parties.
 - b. ban all "sweets" from the classroom.
 - c. allow the child to eat the treats; an occasional "sweet" won't hurt.
 - d. I do not know.
27. Some children with diabetes can become very ill in response to stressful events. This predisposes the child to problems with:
- a. physician visits.
 - b. blood testing.
 - * c. school attendance.
 - d. I do not know.
28. The child with diabetes in your class has numerous absences from school. Your best response is:
- a. realize this is part of the disease.
 - * b. discuss the situation with school nurse and parents.
 - c. send home school work so she/he does not get behind.
 - d. I do not know.

** Questionnaire is reprinted with permission from Melchionne (1990) of Morristown Memorial Hospital, Morristown, New Jersey.

Appendix B

Demographic Questionnaire

1. What is the grade level(s) you are currently teaching? (Circle each letter that applies)
 - a. PRESCHOOL
 - b. KINDERGARTEN
 - c. FIRST GRADE
 - d. SECOND GRADE
 - e. THIRD GRADE
 - f. FOURTH GRADE
 - g. FIFTH GRADE
 - h. SIXTH GRADE
 - i. SEVENTH GRADE
 - j. EIGHTH GRADE
2. What is the size of your class? (Circle letter)
 - a. 0 - 5
 - b. 5 - 10
 - c. 10 - 15
 - d. 15 - 20
 - e. 20 - 25
 - f. 25 - 30
 - g. OVER 30
3. How many years have you been teaching? (Circle letter)
 - a. 0 - 4
 - b. 5 - 9
 - c. 10 - 14
 - d. 15 - 19
 - e. 20 - 24
 - f. OVER 25

(CONTINUED)

4. Do you have a child with diabetes in your class? (Circle letter)
 - a. NO
 - b. YES
5. Have you ever had a child with diabetes in your class? (Circle letter)
 - a. NO
 - b. YES
6. Have you ever had a family member(s) and/or close acquaintance(s) with diabetes? (Circle letter)
 - a. NO
 - b. YES
7. Have you ever had any education regarding diabetes? (Circle letter)
 - a. NO
 - b. YES
8. If yes, please indicate source(s) of information: (Circle each letter that applies)
 - a. PHYSICIAN
 - b. NURSE
 - c. PARENTS
 - d. CHILD
 - e. COLLEGE COURSE
 - f. INSERVICE TRAINING
 - g. PAMPHLETS, BOOKS
 - h. TELEVISION
 - i. OTHER

(CONTINUED)

9. Does the school building where you are employed have a full-time school nurse? (Circle letter)
- a. NO
 - b. YES
10. Does the school building where you are employed have a part-time school nurse? (Circle letter)
- a. NO
 - b. YES
11. Your sex (Circle letter of your answer)
- a. MALE
 - b. FEMALE
12. Your present age: _____ YEARS
13. Which is the highest level of education that you have completed? (Circle letter)
- a. COMPLETED COLLEGE
 - b. SOME GRADUATE WORK
 - c. GRADUATE DEGREE
 - d. DOCTORATE
14. What is the size of the school system (K-12) you are teaching in? (Circle letter)
- a. 0 - 249
 - b. 250 - 499
 - c. 500 - 749
 - d. 750 - 999
 - e. 1000 - 1499
 - f. 1500 - 1999
 - g. 2000 - 3499
 - h. Greater than 3500

Appendix C

(first name) (last name)
(address)
(city), (state) (zip)

Date

Dear (first name):

I am a graduate nursing student at Drake University conducting a study of the level of knowledge of diabetes among elementary school teachers. As a diabetic nurse educator, I am very concerned about the medical care given to children with chronic illness in the school system.

Despite diabetes being three - four times more common than other chronic childhood diseases, few studies have explored the impact this has on school teachers in the classroom. The study I am conducting will describe the level of knowledge of diabetes among elementary school teachers and factors that might influence the knowledge base of teachers to further assist them in meeting the needs of children.

IN ORDER TO CONDUCT THIS STUDY I NEED YOUR HELP. Your name is one of 200 selected at random from the Iowa State Board of Education's list of K - 8 certification within the AEA VII School District. While you are under no obligation to participate in this study, I am asking you to complete the enclosed survey at your earliest convenience and return it in the enclosed envelope. To preserve anonymity, signed consent is not being sought. However, returning the survey indicates informed consent to participate in the study. Please be cautioned that the information on the questionnaire is not intended for instructional purposes regarding diabetes and should not be utilized to diagnose children in the classroom.

You may be assured of complete confidentiality in completing this survey as your name will never be associated with the survey. Identification numbers are included on the survey form for mailing purposes only. These numbers will be used to check your name off the mailing list when your survey is returned and will allow for survey tracking should you decide to withdraw from the study before it is completed.

Should you agree to participate, your prompt return of this survey will be much appreciated. Each survey is vitally important to the success of this study. If you are interested in receiving a copy of the survey results, or additional information regarding diabetes, please include a self-addressed stamped envelope when you return the survey.

Thank you very much for participating in this survey. If you have any questions about this study, please contact either myself at (319) 984-5223 or Dr. Linda H. Brady, Director of the Division of Nursing at Drake University, at (515) 271-2830. Hope you have a great school year.

Sincerely,

Ruth A. Gaede, R.N., B.S.N.
R.R. #1 - Box 133
Denver, IA 50622

Appendix D

Postcard

If you have already completed and returned the survey please accept my sincere thanks. If not, please do so today, for your input is extremely important to the success of this study which I am conducting. Knowing what the level of knowledge is among elementary school teachers and factors that influence this knowledge base will be very valuable in projecting the needs of diabetic and other chronically ill children.

If by some chance you did not receive the survey, or it has been misplaced, please contact me at (319) 984-5223.

Sincerely,

Ruth A. Gaede, R.N., B.S.N.
R.R. #1 - Box 133
Denver, IA 50622



Appendix E

Identification Number

Date

(first name) (last name)
(address)
(city), (state) (zip)

Dear (first name):

About three weeks ago, I mailed you a survey concerning the level of knowledge of diabetes among elementary school teachers and factors that influence that knowledge base. I am writing to you because I have not received your survey.

The purpose of this study is to describe the level of knowledge of diabetes among elementary school teachers and to assist in the future planning to meet the needs of these children. But in order to accurately describe the current situation, I need as much information as possible. Thus, your response is needed to be truly representative of all the elementary school teachers in the AEA VII School District.

In case the original survey did not reach you, or it has been misplaced, a replacement survey is enclosed. I encourage you to complete and return it as soon as possible in the envelope provided. This is important whether or not there have been any diabetic children in your classroom.

If you are interested in receiving a copy of the survey results, please include a self-addressed stamped envelope when you return the survey.

Your contribution to the success of this study will be greatly appreciated. Hope you have a great school year.

Sincerely,

Ruth A. Gaede, R.N., B.S.N.
R.R. #1 - Box 133
Denver, IA 50622

Appendix F Letter

Date

Identification Number

(first name) (last name)

(address)

(city), (state) (zip)

Dear (first name):

I am a graduate nursing student at Drake University preparing to conduct a major study of the level of knowledge of diabetes among elementary school teachers. As a diabetic nurse educator, I am very concerned about the medical care given to children with chronic illness in the school system. Despite diabetes being three-four-fold more common than other chronic childhood diseases, few studies have explored the impact this has on school teachers in the classroom. The study I am conducting will describe the level of knowledge of diabetes among elementary school teachers and factors that might influence the knowledge base of teachers to further assist them in meeting the needs of those children.

IN PREPARING TO CONDUCT THIS STUDY I NEED YOUR HELP. Your name is one of twenty selected at random from the Iowa State Board of Education's list of K - eight certification within the AEA VII School District.

While you are under no obligation to participate in this pilot study, I am asking you to complete the enclosed survey at your earliest convenience and return it in the enclosed envelope. I am also interested in the amount of time required to complete the survey, whether the instructions are clear, and whether you feel any of the questions are too sensitive or perhaps inappropriate. I have also included copies of the proposed cover letter, follow-up post card and second follow-up letter for you to review. I am enclosing a response form for you to complete, but please feel free to make any comments directly on the forms.

You may be assured of complete confidentiality in completing this survey and response form as your name will never be associated with either document. The survey form will include identification numbers that are for mailing purposes only. These will be used to check your names off the mailing list when your survey and response form are returned.

Should you agree to participate in this pilot study, your prompt return of this survey and response form in the envelope will be greatly appreciated. Each response is vital to the success of the planned study. Since your name was selected at random for inclusion in this pilot study, please understand your name may be chosen again for inclusion in the actual study.

Thank you very much for your participation. If you have any questions about this pilot study, please contact either myself at (319) 984-5223 or Dr. Linda H. Brady, Director of the Division of Nursing at Drake University, at (515) 271-2830. Have a great school year.

Sincerely,

Ruth A. Gaede, R.N., B.S.N.
R.R. #1 - Box 133
Denver, IA 50622

Appendix G

Response Form

Identification Number _____

RESPONSE FORM
FOR PILOT STUDY OF
KNOWLEDGE OF DIABETES
AMONG ELEMENTARY SCHOOL TEACHERS

.....

Please feel free to make any comments directly on the survey form

.....

1. Record the approximate amount of time spent completing the survey form.
_____ MINUTES
2. Do you feel the amount of time spent completing this survey was reasonable? (Circle number)
 - a. NO
 - b. YES

If NO, what amount of time would be reasonable?
_____ MINUTES

(CONTINUED)

3. Were instructions clear and concise? (Includes cover letter, survey and follow-up correspondences) (Circle number)
- a. NO
- b. YES

If NO, please specify which areas are confusing. What suggestions do you have for improving the instructions?

4. Did you find any of the questions too sensitive or inappropriate: (Circle number)
- a. NO
- b. YES

If YES, please identify which questions and indicate ways that would make them more appropriate.

5. Please note any additional comments regarding the survey form, cover letter, follow-up correspondence or the study itself.

THANK YOU FOR YOUR ASSISTANCE. PLEASE RETURN THIS FORM, ALONG WITH THE SURVEY IN THE ENVELOPE PROVIDED.

Appendix H

.....

Date

Dear:

I just wanted to thank all of you who responded to the pilot study. The information received was very helpful and since then I have made a few changes. As mentioned in the cover letter you received for the pilot, because your name was selected at random, it will be possible to be drawn again for inclusion in the actual study. If your name is selected again, I would greatly appreciate your time to complete the enclosed survey. If you decide not to participate in the pilot, I hope you consider completing the survey at this time.

Thank you again for your time.

.....

Appendix I

Results of DKTSP

Question #1 Diabetes mellitus is a disease that is of:

Answer	Value	Frequency	Percent
Lifelong	a	132	76.3
Intermittent	c	4	2.3
Do not know	d	36	20.8
No Data	e	1	.6

Question #2 Diabetes mellitus in children is usually a result of:

Answer	Value	Frequency	Percent
Overproduced Insulin	a	3	1.7
Lacking Insulin	b	100	57.8
Insulin Ineffective	c	2	1.2
Do not know	d	67	38.7
No Data	e	1	.6

Question #3 Diabetes mellitus in children is also known as:

Answer	Value	Frequency	Percent
Type I	a	52	30.1
Type II	b	1	.6
Do not know	d	119	68.8
No Data	e	1	.6

Question #4 Adult onset diabetes differs from childhood onset diabetes in that the adult is usually:

Answer	Value	Frequency	Percent
Overweight/Injection	a	47	27.2
Overweight/Mouth	b	48	27.7
Normal/No Medication	c	10	5.8
Do not know	d	67	38.7
No Data	e	1	.6

Question #5 In most cases, the treatment of diabetes mellitus in children includes:

Answer	Value	Frequency	Percent
Diet Only	a	12	6.9
Diet/Exercise/Mouth	b	10	5.8
Diet/Exercise/Injection	c	93	53.8
Do not know	d	57	32.9
No Data	e	1	.6

Question #6 The dietary aspect of treatment of diabetes in children is characterized by a meal plan which attempts to:

Answer	Value	Frequency	Percent
Restrict Sweets	b	45	26.0
Provide Normal	c	96	55.5
Do not know	d	31	17.9
No Data	e	1	.6

Question #7 The rationale for testing daily blood samples for sugar is to:

Answer	Value	Frequency	Percent
Evaluate Treatment	b	130	75.1
Determine Calories	c	18	10.4
Do not know	d	24	13.9
No Data	e	1	.6

Question #8 Hypoglycemia is a condition in which the blood sugar level is:

Answer	Value	Frequency	Percent
Low	a	117	67.6
High	b	29	16.8
Do not know	d	27	15.6

Question #9 Two causes of hypoglycemia are:

Answer	Value	Frequency	Percent
High Insulin/Lack of	a	50	28.9
Low Insulin/Lack of	b	38	22.0
Low Insulin/Too much	c	9	5.2
Do not know	d	69	39.9
No Data	e	7	4.0

Question #10 Signs of hypoglycemia include:

Answer	Value	Frequency	Percent
Frequent Urination	a	35	20.2
Hyperactivity/Flushed	b	1	.6
Lack Concentration	c	82	47.4
Do not know	d	52	30.1
No Data	e	3	1.7

Question #11 If you have a student becoming hypoglycemic, your response is to:

Answer	Value	Frequency	Percent
Only Observe	a	2	1.2
Get Juice	b	119	68.8
Call Parents	c	1	.6
Do not know	d	50	28.9
No Data	e	1	.6

Question #12 Following your treatment of a hypoglycemic reaction, you will:

Answer	Value	Frequency	Percent
Send Child Home	a	5	2.9
Stay with Child	c	127	73.4
Do not know	d	39	22.5
No Data	e	2	1.2

Question #13 Another term for hypoglycemia is:

Answer	Value	Frequency	Percent
Acetone Reaction	a	2	1.2
Insulin Reaction	b	64	37.0
Ketone Reaction	c	2	1.2
Do not know	d	104	60.1
No Data	e	1	.6

Question #14 Hyperglycemia is a condition in which the blood sugar is:

Answer	Value	Frequency	Percent
Low	a	30	17.3
High	b	97	56.1
Do not know	d	45	26.0
No Data	e	1	.6

Question #15 Two causes of hyperglycemia are:

Answer	Value	Frequency	Percent
Low Insulin/Too Much Food	a	30	17.3
Low Insulin/Lack of Food	b	19	11.0
High Insulin/Too Much Food	c	31	17.9
Do not know	d	83	48.0
No Data	e	10	5.8

Question #16 You would recognize hyperglycemia by which of the following:

Answer	Value	Frequency	Percent
Sweaty/Pale	a	18	10.4
Frequent Urination	b	41	23.7
Shaking	c	31	17.9
Do not know	d	82	47.4
No Data	e	1	.6

Question #17 If you have a non-diabetic or diabetic student exhibiting symptoms of hyperglycemia, your response would be to:

Answer	Value	Frequency	Percent
Let Student Know	a	4	2.3
Contact Nurse	b	84	48.6
Contact Parents	c	31	17.9
Do not know	d	35	20.2
No Data	e	19	11.0

Question #18 The physiological effect of exercise on a well controlled diabetic child is to:

Answer	Value	Frequency	Percent
Lowers Blood Sugar	a	75	43.4
Raises Blood Sugar	b	11	6.4
No Effect on Blood Sugar	c	14	8.1
Do not know	d	71	41.0
No Data	e	2	1.2

Question #19 The best time for a child with diabetes to have physical education is:

Answer	Value	Frequency	Percent
Prior to Food	a	4	2.3
Following Food	b	62	35.8
Two Hours after Insulin	c	3	1.7
Do not know	d	103	59.5
No Data	e	1	.6

Question #20 You observe the child with diabetes in your class trading sandwiches with another student. Your response would be to:

Answer	Value	Frequency	Percent
Contact Nurse	a	90	52.0
Remove Child	b	1	.6
Reprimand Children	c	38	22.0
Do not know	d	38	22.0
No Data	e	6	3.5

Question #21 Children with diabetes may experience:

Answer	Value	Frequency	Percent
Paranoia	a	2	1.2
Aggressive	b	8	4.6
Fear of Embarrassment	c	102	59.0
Do not know	d	58	33.5
No Data	e	3	1.7

Question #22 Snacks are part of the well balanced meal plan for the child with diabetes. They are an essential component because they:

Answer	Value	Frequency	Percent
Prevent Hypoglycemia	a	135	78.0
"Free Foods"	b	1	.6
Help Child Feel Normal	c	13	7.5
Do not know	d	21	12.1
No Data	e	3	1.7

Question #23 Typically, you may find the parents of children with diabetes mellitus are:

Answer	Value	Frequency	Percent
Over-Protective	b	132	76.3
Do not know	d	37	21.4
No Data	e	4	2.3

Question #24 Because of the nature of the illness, a child with diabetes mellitus may feel:

Answer	Value	Frequency	Percent
Need Rigid Schedule	a	39	22.5
Self-Sufficient	b	13	7.5
Lack of Control	c	71	41.0
Do not know	d	46	26.6
No Data	e	4	2.3

Question #25 School age children need peer acceptance. To assist a child with diabetes to gain this acceptance you may:

Answer	Value	Frequency	Percent
Child Discusses Hospital	a	13	7.5
Child Discusses Diabetes	b	152	87.9
Do not know	d	7	4.0
No Data	e	1	.6

Question #26 Class and birthday parties are a social aspect of school. If you have a child with diabetes, how best can you handle this situation?

Answer	Value	Frequency	Percent
Discuss with Parents	a	166	96.0
Ban Sweets from Class	b	1	.6
Do not know	d	6	3.5

Question #27 Some children with diabetes can become very ill in response to stressful events. This predisposes the child to problems with:

Answer	Value	Frequency	Percent
Physician Visits	a	4	2.3
Blood Testing	b	10	5.8
School Attendance	c	118	68.2
Do not know	d	36	20.8
No Data	e	5	2.9

Question #28 The child with diabetes in your class has numerous absences from school. Your best response is:

Answer	Value	Frequency	Percent
Accept as Normal	a	6	3.5
Discuss with Parents	b	141	81.5
Send Home School Work	c	18	10.4
Do not know	d	5	2.9
No Data	e	3	1.7